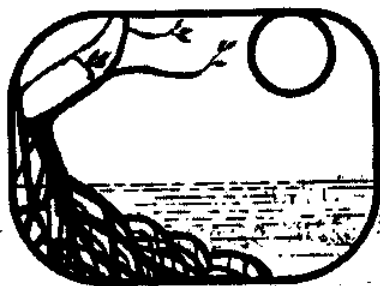
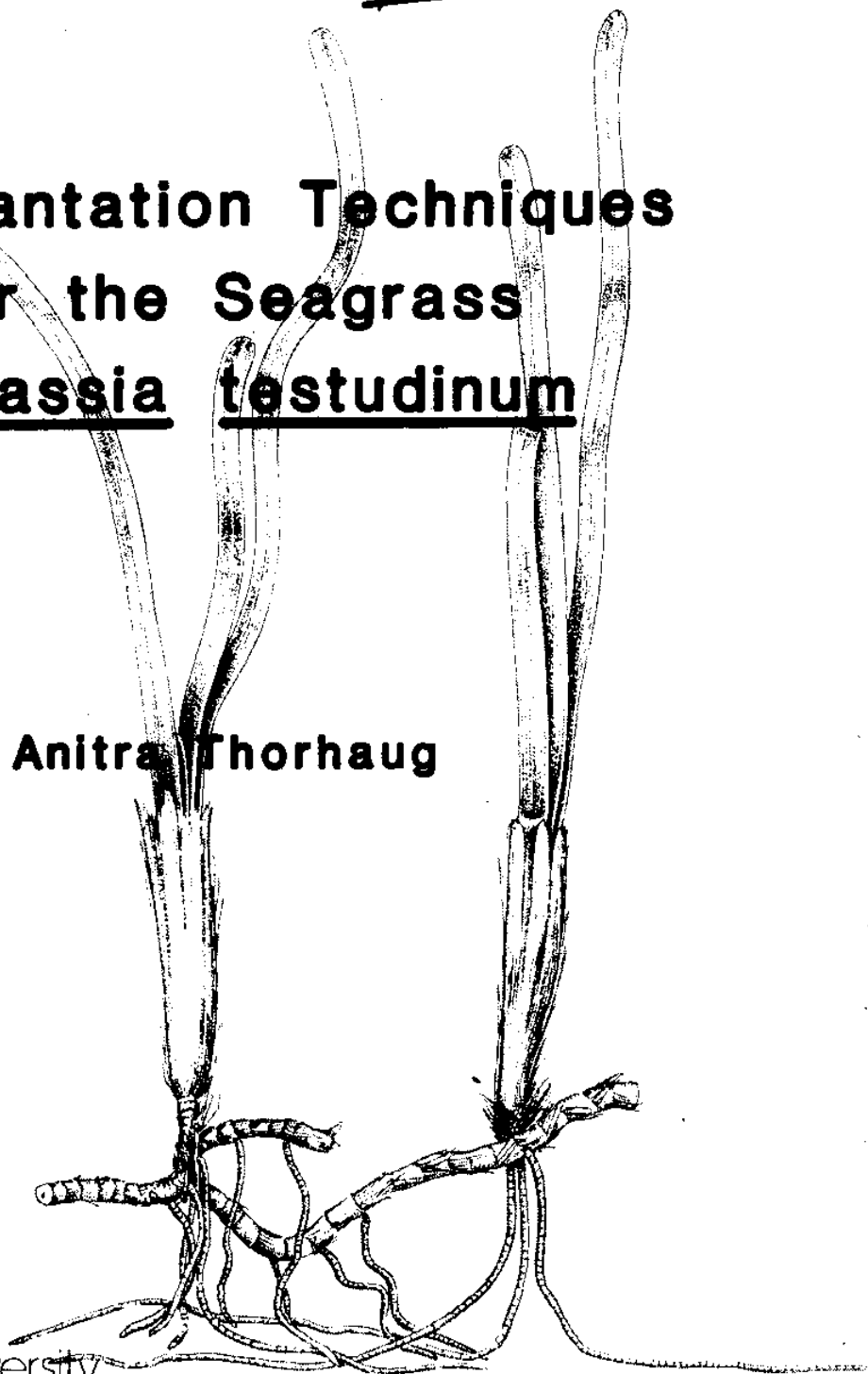


CIRCULATING COPY
Sea Grant Depository

LOAN COPY ONLY

Transplantation Techniques for the Seagrass Thalassia testudinum

Anitra Thorhaug



University
of
Miami
Sea
Grant

Technical Bulletin
Number 34
June, 1976

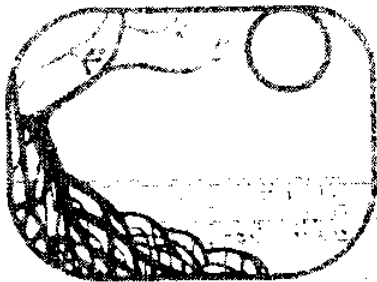
CIRCULATING COPY

Sea Grant Library

LOAN COPY ONLY

Transplantation Techniques for the Seagrass Thalassia testudinum

Anitra Thorhaug



Technical Bulletin
Number 34
June, 1976

Transplantation Techniques for the Seagrass Thalassia testudinum

**Anitra Thorhaug
Department of Microbiology
University of Miami School of Medicine**

**University of Miami
Sea Grant Program
June, 1976**

Price: \$1.25

This work is a result of research sponsored by NOAA Office of Sea Grant, U.S. Department of Commerce, under Grant #04-5-158-14. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that might appear hereon.

Information Services
University of Miami
Sea Grant Program
P. O. Box 248106
Coral Gables, Florida 33124

INTRODUCTION

General

Seagrass communities are an important nearshore resource. They serve as nurseries and energy source for a number of sports and commercial fisheries species (Tabb, Dubraw and Manning, 1962; Odum, 1974). In many areas the production of plant material is approximately that of major food crop materials (Odum, 1974). The seagrasses function as a source of storage and transfer of mineral materials between water and sediment. In addition seagrasses stabilize sediment, the root systems compact sediment, and the biota growing on seagrasses produce sedimentary materials (Wanless, 1974).

Dredging activities in shallow nearshore waters in the Gulf of Mexico and southeast coast of the United States as well as tropical islands such as Puerto Rico have done considerable damage to seagrass beds. The beds grow back only very slowly, after many decades. Removal of beds is accompanied by a loss of fish and invertebrates (Roessler, 1971).

In order to provide alternatives for re-establishing seagrass beds in damaged areas, transplantation techniques have been attempted. The dominant seagrass in the Gulf of Mexico and the Caribbean is the turtle grass Thalassia testudinum. Efforts have concentrated on plugging and seeding this seagrass.

METHODS

Plugging

Several workers have attempted plugging of seagrass including Phillips

(1960), Kelly, et al., (1971), where mortality of 60% was found, Van Breedveld (1974) and ourselves. Of these, the most successful was Van Breedveld and his techniques are described below.

A posthole digger is employed to remove plugs from a mature bed close to the area to be revegetated. Blades of the digger must be opened and inserted to about 30 cm into the substrate. The blades are then closed, lowering the handles to a 30 degree angle and then pulling up the substrate and blades in a clump. Optimal size is four to seven short

strands. These plugs are then moved to the site. A second hole at the

site is dug with the posthole digger and the clump is planted into the hole with substrate firmly packed around the plug.

Growth promoting substances which have been used are 5% naphthaline acid in seawater and 5% root-dip solutions (indole 3, butyric acid at .07%, α -naphthaline acetimide at .05%, α -naphthaline acetic acid at .05%, captan, n-trichlormethylmercapto-4-cyclohexene -1, 2-dicarbioximide .2%, thiram, tetramethyl thiuran disulfide 2%, and inert ingredients 95.83%.)

The transplants are made to insure clumps of four to seven short shoots plus the sediment to 30 cm. The sediment acts as an anchor as well as providing nutrients and other favorable conditions such as proper pH, Eh, etc. Planting is most successful in several rows planted about 30 cm apart with an equivalent distance between clumps. Time of transplantation which appeared most favorable was winter. The rationale given by Van Breedveld was that the plants were in a semi-dormant state allowing the plants to become stabilized.

Seeding (from Thorhaug, 1974)

Fruits are gathered by hand from beds which are densely fruiting. They should immediately be dehisced, separating seeds from fruit pods. Seeds are then transported under running seawater conditions to the site

for immediate planting or can be nurseried.

Nursery procedures found to be optimal are planting seedlings in containers with peat in low energy shallow water. If seedlings are planted into the sediment directly many are lost and others grow roots and rhizomes too fragile to remove so that plants are damaged when transferred for revegetation. A third method is to suspend seedlings in running seawater. Crowding, disease, and breakage occurs in large proportion in this method causing up to 80% loss.

Various growth promoting hormones were used. NAA (naphthalene acetic acid) soak at 10% for one hour appeared to increase significantly root propagation of the seedlings. Longer soak times and higher concentrations did not appear to affect the roots significantly.

Planting procedures at the site include a series of anchoring techniques ranging from no anchor, through plastic anchors attached to each plant, peat pots, and biodegradable paper. Seedlings can be planted at almost any interval from 200 per meter square to one per meter square. Some crowding is noted at the higher end.

Faster growth of blades and rhizomes was noted in the plants in areas where a secondary pioneer seagrass Halodule wrightii had already begun to colonize. Therefore, planting of a mixed grass population is recommended, although details have not yet been worked out for planting the second grass. Sprigging has been accomplished on several occasions with success.

Site Requirements

Although little is known about precise specifications some generalizations can be made at this time.

Turbidity and light penetration act to limit depth of planting, so that in many areas there is a lower limit to successful revegetation.

Other grasses such as Halophila are often found as lower fringes on Thalassia beds and would be worthwhile trying to replant. In general, Thalassia grows from low mean tide to depths of as much as 75 feet in clear water. A major problem of revegetating an impacted area is that the water may have become more turbid due to the impact. As the grass progressively expands, the areas become clearer.

Sediment type is important, although usually not limiting to seagrass revegetation. Peaty sediment appears optimum, whereas coarse calcium carbonate sediments such as are found on certain spoil islands where carbonate rock has not been finely ground appears less promising. Quartz, silica, and ordinary calcium carbonate sediments are adequate for revegetation.

Energy regimes are important in the success of revegetation. Heavy wave action, periodic waves from boats such as found in intracoastal waterways do not favor high survival of seedlings (little data is available on plugs). Areas where strong tidal currents appear daily have lower survival than calmer areas.

Salinities which Thalassia can withstand vary from 20⁰/oo to 55⁰/oo.

RESULTS

Plugging

Results as Kelly et al. showed fairly high mortality in several planting locations (80% and 60%). Perhaps the most pertinent result is that there was extremely little lateral spreading of the plants by growth of the apical meristem. The ultimate success of recolonization depends on this factor. Apical meristems are very infrequent in normal Thalassia beds.

Plugging by Van Breedveld showed clumps in several rows to be the most stable method of replanting. Hormones did not appear to be an advantage

per this method. Siltation was a major problem, especially in areas of mechanical denudation. Once again, lateral spread was very infrequent.

Seeding

Excellent survival resulted in 31.2% missing, dead or dormant after nine months, lateral expansion began within two months and eight months later 90% of the plants had expanded laterally. After one year many plants had grown one to one and one-half feet laterally, producing short shoots with five blade bundles each at five cm intervals.

DISCUSSION

Thalassia can be replanted in impacted areas throughout the Gulf of Mexico, Southeast Florida coast, and the Caribbean. Two methods of replanting have been demonstrated to be feasible and the advantages of each will be discussed.

The seeding method has several strong advantages: First, lateral spread of the plants allows far better revegetation than plugging over a period of time.

Second, the bed from which the seeds are gathered is left intact, whereas damage (not yet precisely clear how much) is done when plugs are cut from the original bed.

Third, ease of transport and anchoring of seeds exceeds that of plugging.

Fourth, on a large-scale operation, seeding is less time consuming and demands less labor for collection and planting.

Fifth, the plugging method has only been demonstrated in shallow (two to four feet) water because of the difficulty of manipulation of the posthold digger, whereas seeding can be done to any depth.

The advantages of the plugging method are not as numerous: First, plugs from mature beds can be taken throughout the U.S. coastal waters, whereas seeds are sparse or absent in many places.

Second, transportation of plants is therefore cut to a minimum.

Third, plugging can be done all year long while seeding is best in fall or spring.

The seeding method definitely appears to be most advantageous for spoil island stabilization where extensive planting to a maximum feasible depth is desired.

LITERATURE CITED

- Ly, J.A. Jr., C. M. Fuss, and J.R. Hall, 1971. The transplanting and survival of turtle grass, Thalassia testudinum, in Boca Ciega Bay, Florida. Fish Bull. 69(2): 273-280.
- Odum, H. T., Tropical marine meadows. In - Coastal Ecological Ecosystems of the U.S., Vol. 1 (H. T. Odum, Ed.) Conservation Foundation, Washington, D.C.
- Slusher, M., 1971. Environmental changes associated with a Florida Power plant. Mar. Poll. Bull. 2(6): 87-90.
- Ward, D. C., and P. A. Manning, 1961. Bull. Mar. Sci. 11(4): 552-556.
- Whitcomb, A., 1974. Transplantation of the Seagrass Thalassia testudinum. Konig. Aquaculture 4: 177-183.
- Breedveld, 1974. Transplanting of seagrasses with emphasis on the importance of substrate. Fla. State Dept. Nat'l Resources Bull. (in press.)

